

REMARKS

Applicant requests favorable reconsideration and allowance of the subject application in view of the preceding amendments and the following remarks.

Claims 1-28 are presented for consideration. Claims 1, 13, 14 and 25-28 are independent. Claims 1, 13, 14 and 25-28 have been amended to clarify features of the subject invention. Support for these changes can be found in the original application, as filed. Therefore, no new matter has been added.

Applicant notes with appreciation that claims 26 and 27 have been indicated as being allowable over the art of record. Applicant has amended these claims to clarify features of the subject invention, in accordance with the changes made to the remaining claims. Applicant submits, however, that these claims should remain allowable.

Applicant requests reconsideration and withdrawal of the objection and rejections set forth in the above-noted Office Action.

Claims 1, 13, 14, 25 and 28 were objected to on formal grounds. The Examiner objected to the recitations regarding the interferometer and the computing unit. This objection is respectfully traversed. Nevertheless, Applicant has amended independent claims 1, 13, 14, 25 and 28, in light of the Examiner's comments. Applicant submits that these changes overcome the Examiner's objections. Such favorable indication is requested.

Turning now to the art rejections, claims 1-5, 9-18, 22-25 and 28 were rejected under 35 U.S.C. § 103 as being unpatentable over U.S. Patent 5,898,501 to Suzuki. Claims 3, 6-18 and 19-21 were rejected under 35 U.S.C. § 103 as being unpatentable over the Suzuki patent in view

of U.S. Patent No. 5,815,268 to LaFleur. Applicant submits that the cited art, whether taken individually or in combination, does not teach many features of the present invention, as previously recited in claims 1-25 and 28. Therefore, these rejections are respectfully traversed. Nevertheless, Applicant submits that independent claims 1, 13, 14 and 25-28, for example, as presented, amplify the distinctions between the present invention and the cited art.

In one aspect of the invention, independent claim 1 recites a measuring system for measuring performance of an imaging optical system. In another aspect of the invention, independent claim 13 recites a projection exposure apparatus for performing projection exposure by use of an imaging optical system. These claims recite, among other features, (i) an interferometer for measuring transmission wavefronts in relation to at least one of plural measurement points defined along a plane perpendicular to an optical axis of the imaging optical system, wherein position coordinates of imaging points of the plural measurement points are measured, and (ii) a computing unit. The computing unit calculates at least one of a wavefront aberration and an imaging state of the imaging optical system on the basis of information regarding the transmission wavefronts measured by the interferometer and the position coordinates as measured. The computing unit corrects at least one of the calculated wavefront aberration and an imaging state at a measurement point, while taking, as a reference, at least one of the wavefront aberration and an imaging state at a standard point set along a plane perpendicular to the optical axis.

Independent claim 26 recites a method of measuring performance of an imaging optical system. This claim has been patterned after independent claim 1.

In another aspect of the invention, independent claim 28 recites a measuring system for measuring performance of an imaging optical system. The measuring system includes (i) an interferometer for measuring transmission wavefronts of the imaging optical system with respect to at least one of plural points which are defined along a plane perpendicular to an optical axis of the imaging optical system, and (ii) a computing unit. The computing unit calculates at least one of the wavefront aberration and an imaging state of the imaging optical system, on the basis of information regarding transmission wavefronts as measured by the interferometer. The computing unit corrects at least one of the calculated wavefront aberration and an imaging state with respect to a measurement point, while taking, as a reference, at least one of a wavefront aberration and an imaging state with respect to another measurement point being set along a plane perpendicular to the optical axis.

In still another aspect of the invention, independent claim 14 recites a measuring system for measuring performance of an imaging optical system, while independent claim 25 recites a projection exposure apparatus for performing projection exposure by use of an imaging optical system. These claims recite, among other features, an interferometer for measuring transmission wavefronts in the manner discussed above with respect to independent claims 1 and 13. These claims also recite a computing unit, this time, for calculating at least one of distortion and curvature field of the imaging optical system on the basis of information regarding the transmission wavefronts measured by the interferometer and the position coordinates as measured, and the computing unit correcting at least one of the calculated distortion and

curvature of field at a measuring point, while taking, as a reference, at least one of distortion and curvature of field at a standard point set along a plane perpendicular to the optical axis.

Independent claim 27 recites a method of measuring performance of an imaging optical system, and has been patterned after independent claim 14.

Applicant submits that the cited art, whether taken individually or in combination, does not teach or suggest such features of the present invention, as recited in the independent claims.

The Examiner relies on the Suzuki patent for teaching an interferometer for measuring transmission wavefronts of a test lens/objective at a plurality of measurement points and a computing unit that is in communication with the interferometer and is operable to calculate at least one of wavefront aberration, imaging state, distortion and curvature of field on the basis of information regarding the transmission wavefronts. The Examiner notes, however, that the Suzuki patent does not teach or suggest the additional computing function of taking one of the measurement points as a standard (reference) point and using the standard point values to correct data collected from other measurement points. Regarding this feature, the Examiner takes the position that "one skilled in the art would contend that a computing unit can be made operable to perform any sort of calculation as desired. Suzuki's calculation unit is no exception." This unsupported contention is respectfully traversed.

The present invention, and particularly, the computing unit recited in the independent claims, is very effective in correcting drift of measured values. Such drift in measured values may be with respect to wavefront aberration, imaging state, distortion and curvature of field, for

example, in response to a change in the measurement environment or the like. Applicant submits that the Suzuki patent is silent with respect to such features of the present invention.

Still further, it is well settled that the Examiner must cite art and cannot rely on opinion or judicial notice at an exact point of novelty recited in the claims. *See Ex Parte Cody*, 148 USPQ 162 ((PTO Bd. App. 1965). In this regard, and contrary to the Examiner's assertion, the issue is not whether a computing unit "can be made operable to perform any sort of calculation as desired," but rather, the issue is whether the Suzuki patent teaches such features. Applicant respectfully submits that the Suzuki patent does not teach such features of the present invention, especially, those of the computing unit, as recited in the independent claims.

Applicant further submits that the remaining art cited does not cure the deficiencies noted above with respect to the Suzuki patent. The Examiner relies on the LaFleur patent for teaching an arrangement that allows at least a pair of points to be measured simultaneously. Applicant submits, however, that the LaFleur patent, as with the Suzuki patent, does not teach or suggest the salient features of Applicant's present invention including those of the computing unit as recited in the independent claims. Therefore, the LaFleur patent adds nothing to the teachings of the Suzuki patent that would render obvious Applicant's present invention as recited in the independent claims.

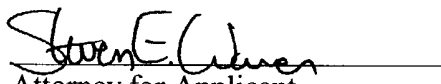
For the foregoing reasons, Applicant submits that the present invention, as recited in independent claims 1, 13, 14 and 25-28, is patentably defined over the cited art, whether that art is taken individually or in combination.

Dependent claims 2-12 and 15-24 also should be deemed allowable, in their own right, for defining other patentable features of the present invention in addition to those recited in independent claims 1 and 14, respectively. Further individual consideration of these dependent claims is requested.

Applicant further submits that the instant application is in condition for allowance. Favorable reconsideration, withdrawal of the objection and rejections set forth in the above-noted Office Action and an early Notice of Allowance are requested.

Applicant's undersigned attorney may be reached in our Washington, D.C. office by telephone at (202) 530-1010. All correspondence should be directed to our address listed below.

Respectfully submitted,


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